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AIMS AND PURPOSES OF THE CHRISTIAN SOCIAL MOVEMENT [1]

1. When studying the history of the nineteenth century we cannot but be struck by a most tragic feature. In the great discoveries in the technical and scientific fields the human mind made victories as had not been witnessed for many ages. Human knowledge rose to almost dazzling heights. At the same time, however, the secularization process in the intellectual and social aspects of life, which started as early as the Renaissance and Humanism, was speeded up in a really appalling degree. Creation, now reckless on account of its enormously increased knowledge and its almost unlimited power to rule and avail itself of the forces of nature, seperated itself more and more from its Creator and His revelation in Jesus Christ.

Secularization in the intellectual *and* social aspects of life! For never would the unheard of nineteenth century social conditions have arisen, if the Gospel had got sufficient hold of the minds and if the church of those days had understood that preaching and cure of souls should exercise its stimulating and reforming influence on the social life too. Thus, conditions arose which have frequently been depicted in strong colors by authors of several countries and which ultimately gave rise to the gigantic economic development of the Western European countries, a development, however, which was bought with the blood and tears of the women, children and men of the working class of the nineteenth century and the early part of the twentieth century.

When we condemn the church of that age, we must not overlook the fact that there were in that church groups of smaller and larger significance which pointed out the danger of the spiritual and social situation, and which, each in its own way, gave out a summons for confessing anew that Jesus Christ is Lord of the whole of human life. In Denmark we think of Grundtvig, whose speeches and writings were like a bugle call amidst a sleeping church and a sleeping people. Here we must surely also name Vilhelm Beck, the father of the "Indre Mission" in the Danish church, who stimulated so much Christian work in Denmark. In Germany our thoughts go to Wichern with his "Innere Mission" (Home Mission) which expressed itself in word and deed, and to such men as Tholuck and von Thadden who pointed away from the Gospel denying rationalism back to the living Word. In Switzerland the attention is attracted by the Revival in Geneva and in Waadtland, which through the inspiring preachings of Cesar Malan, Merle d'Aubigné and Vinet restored the Cross and the Resurrection as realities in human life.

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[1] This article contains a lecture, held at the Fourth Congress of the International Federation of Evangelical Workers' Associations, Copenhagen, 9—11 May 1950.

In The Netherlands we cannot overestimate the significance of the "Reveil" and the revival of Calvinism, in the struggle for which men like Groen van Prinsterer, O. G. Heldring and Abraham Kuyper devoted their lives.

It is in this nineteenth century world, with its alarming apostasy and yet its blossoming of new spiritual life here and there, with its rapidly increasing wealth for the few and pauperization of the many, that the Christian social movement rose. Into this degenerated Western European world, corroded by avarice, this movement made its entry, proclaiming that renovation of the violated social relations is only possible by a renewed avowal of the Gospel of Jesus Christ and a living up to it.

Two things were placed in the foreground by this movement. In the first place there was a recognition of the human dignity of the worker. Labor must not be severed from the person of the laborer. Manpower is not a mere means of production only defined in a businesslike way, such as a machine, a factory building or a patent. Labor is indissolubly connected with man, who is created in the image of his Creator and who is called to serve and glorify his Creator in his labor. According to Genesis 1 : 26 and 27 the real sense of man's creation in God's image and after His likeness is "Man's having dominion over creation". The image of God is a task; man has been called upon to have dominion. [2]).

When the Christian social movement takes into account the origin of the world's history and man's creation in the image of God, it does so in order that the labor relations of the twentieth century might be so organized that the workers' calling to have dominion over creation might be realized.

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[2]) I owe this idea to Dr A. van Selms, professor at Pretoria. See his beautiful explanation of the Creed "Licht uit Licht" (Light from Light) Amsterdam 1948, p. 42.

Side by side with this recognition of the human dignity of the worker, the Christian social movement placed the idea of cooperation in the industrial life. The commandment to love one's neighbor has also its consequences for social life. He who has understood the word of the apostle John: "If a man say, I love God, and hateth his brother, he is a liar; for he that loveth not his brother whom he hath seen, how can he love God whom he hath not seen?" (I John 4 : 20), can have no peace with the idea of class-struggle as a fact and must, with all that is in him, oppose those who want to force upon him class-struggle as a normative principle. Employer and worker are each other's neighbors, because they are called upon to do the same work in the same business and in the same trade. For both of them, their "having dominion" must come to its own. This cannot be effected in the way of continual struggle, but only in the way of cooperation and joint consultation.

2. The development of modern labor legislation began in all Western European countries with restrictions for working hours. Wherever governments took action, this was the startingpoint; it was also the point upon which trade-unionism directed its efforts during the first period of its existence. Obviously it was the destructive effect on the family-life and the endless weariness of a trying days labor, which were taken into account more than scanty wages.

The significance of the regulations for working hours (now in Western Europe, as a rule, resulting in a working-week with an average maximum of 48 hours) should not only be seen as a protection of the worker from undue fatigue and consequently as reaching a labor capacity that renders the highest possible economic profit, but as something of wider significance. It was remarkably well denoted by the highest judicial court in the Netherlands, the Supreme Court of the Netherlands, in a decision of October 26, 1931. In this lawsuit the question was dealt with as to whether the time during which a worker must be present in a store should be regarded as his workingtime, or the time during which he is actually waiting on customers and is engaged in other work connected with it. The Supreme Court judged in favour of the first, considering that there is a general trend in the Netherlands Factory Act not only to protect the worker from undue fatigue, but also to give him an opportunity to dispose freely of a sufficient part of his time for his own development and for the recreation and interests of his family.

In the regulating of working-hours, the limiting of night and Sunday work and the aiming at half-holidays on Saterdays, the recognition of a worker in his human dignity manifests itself. He cannot fulfil his vocation in his labor and in his family when he is wornout by too long hours or by working too hard. It is not, therefore, ever shorter working-hours, for which the Christian social movement is striving. Labor is essential to man. It is in developing the possibilities hidden in creation that he fulfils his godly vocation. A too great shortening of working-hours results in decadence, and promotes indulgence in lower pleasures. The end in view should not be that a laborer works as little as possible, but that he works as much and as well possible within the bounds resulting from the recognition of the fact that he, too, was created in God's image. Yet it may be necessary to assume a further shortening of working-hours in times of unemployment. After all it is better that as many workers as possible work for a shorter time than is normal, than that many workers miss the blessings of working continuously.

That's why the 48-hour week is no dogma. We can safely say that for the normal industrial relations in Western Europe it marks about the right line between the times for working and resting. In countries that suffered badly from the late war and which, in consequence, have to take full recourse to the original source of making capital, viz. labor, it may be a duty to accept longer hours, the shift-system and such, exactly because labor is man's vocation. Care must be taken, however, that labor should not become too heavy a burden. And it should be borne in mind that every lengthening of working hours does not heighten labor-productivity in the same proportion. Experiments made in the Allied Countries during World War II proved that lengthening of working-hours only within certain limits gives good results. If those limits are surpassed, the daily labor output goes down.

3. After this greatest distress concerning working-hours had been met, the problem of social insurance was taken up. As for industrial injuries insurance, labor, conceived of as a business, as a means of production, was the issue at the beginning. For the doctrine of the "risque professionnel" (professional risk), on which workmen's compensation is founded, is that just as machinery breakdowns in a factory have to be borne by the owners, so the recovery of a worker, accidently injured in doing his work, should be borne by the employer.

For the other social insurances, this ground does not hold, nor, for that matter, is it the only ground for compensation in the case of industrial injuries insurance. In view of the fact that the worker's labor is his only source of income, the recognition of the worker in his human dignity must lead to the conclusion that the recompense for his labor must suffice to provide for his own living *and that of his family,* not only when he works, but also when he cannot work, due to circumstances beyond his control. So several countries now grant family allowances when the wages are not enough for workers who have the education of children to pay for. Because these wages, as a rule, do not enable one to save to pay for medicine surgery, hospital bills, health requirements, vacations etc. compulsory insurance must be effected to help pay for these items.

It is desirable to adhere as much as possible to these grounds for compulsory *insurance* because then the relation between these insurance benefits and the labor of the worker is stressed. It is also recommendable that the laborer pays part of the premium; and it is important, too, to implicate labor to a high degree in the organization and execution of the social insurance. Labor law and, consequently, the right to social insurance must not only have in view the improvement of the material position of the worker, but also his spiritual uplifting. That is why everything must be done to make the worker see that social insurance is his own affair for which he himself is also responsible. Its existence should not cause him to be lax, but should stimulate him to greater effort in order to make the threat of illness, accident, old age and unemployment as small as possible to himself and his fellow-workers. Especially Christian trade-unionism should impress upon its members that the extension of social insurance does not give freedom to be careless in one's work, but enables him to do this work with greater devotion and happiness.

4. In the above we have come across the word "unemployment". I have no hesitation in calling this the greatest evil in our social order. For it deprives the laborer of that which is both his only possession and the constitutive element of his nobility, namely, his labor. The insecurity of living, which results from the arbitrariness of an employer or an unstable economic system is paralyzing. The best of social securities is to be found in stable employment. The measures to further this end, such as the supervision of investments and of the establishment and expansion of business enterprises, the forming of a con-

juncture fund, the carrying out of public works and the shortening of working-hours are, for the greater part, of an economic nature. This does not mean, however, that only employers and government authorities are entitled to consider and decide about these matters.

Labor, too, should have a word in these matters and on the same level as the employers. For the problems of employment are of a far-reaching social consequence. This, however, is not the chief reason for the right of labor to joint consultation. But rather, it is the fact that the rate of employment in a country determines the possibility of the worker to fulfil his calling towards God, his family and his country.

The maintenance of employment is so important, even from a moral point of view, that especially in the present international struggle to recover sound economic relations it may be necessary to accept a lower standard of living, if, in doing so, increasing unemployment could be prevented. Of course, I do not mean to say that trade-unionism should not give its full attention to the purchasing power of wages and particularly of those in the warstricken countries. Both the decline of employment and the lowering of the standard of living are evils to the worker, who has always been economically vulnerable. In a country such as the Netherlands, however, a, let us hope, temporary lowering of the standard of living is inevitable if we want to maintain, in the future, a reasonable level of employment and a reasonable living-standard.

Aiming at a stable level of employments gives the workers collective protection. Besides this, individual protection is necessary, not only from unlawful, but also from wrongful dismissal. In most countries civil law does not secure a worker against notice, but does bind the notice, which an employer is free to give, to certain terms. Sometimes the worker has a right to a longer term of notice according as he has been engaged for a longer period. In Denmark, for example, an employee, who has been employed for six months is entitled to three month's notice, which term is lengthened by a month for every three years' employment. The maximum is six month' notice.

Germany has known, since the "Betriebsrätegesetz" (Works councils Act) of 1920, a right of the worker to oppose a given notice, "wenn die Kündigung sich als eine unbillige, nicht durch das Verhalten des Arbeitsnehmers oder durch die Verhältnisse des Betriebs bedingte Härte darstellt" (when the notice is unfair and is not made necessary because of the worker's conduct or the circumstances of the undertaking). Arbitration boards were set up to judge the worker's complaints,and, if they were found to be justified, to compel the employer to engage the worker again or to give him compensation. The employer could choose between the two.

In the Netherlands a bill has been put before parliament now, in which the Danish and German systems are combined. If this bill is to become an act of parliament, the term of notice for an employer will be at least a week for every full year that the worker was in his service, with a maximum of 26 weeks notice. At the same time the worker can appeal to the law if he thinks that the employer has terminated his service "apparently unreasonably". If the judge is of the opinion that the worker is right, he may either award him indemnification or order the employer to re-establish the service. (This re-establishment may be also be replaced by a compulsory payment of indemnification).

In my opinion the German regulation is preferable to the possibility of lengthening the term of notice. The latter restricts the freedom of employer and worker too much. If a worker is allowed to oppose a dismissal that is "unbillig hart" (unreasonably severe) or "apparently unreasonable", he is sufficiently protected, and there is no longer the necessity of lenghthening the term of notice.

I should like to direct the attention to the fact that in such a case not only is the employer ordered to engage the worker again, but also to the fact that according to the Netherlands bill the worker, if he himself gives notice "apparently unreasonably", may be ordered to go back to the employer. Here we see again the recognition that the relation of labor is not a purely material one, such as other contract relations, but that it has a strongly personal character.

5. Labor law did not only develop by means of acts and regulations of governments but, also just as much, by means of collective agreements, contracts made by the industrial partners themselves, that is the employers and workers. Thus the protection of the wages has not become a business of the government only, but has also been settled by labor itself together with the employers by means of collective agreements.

The Christian social movement has always promoted collective agreements, because it saw in it a realization of its goal for a worker to have his own responsibility *and* of its goal to effect a joint consultation and co-operation with the employers. It is remarkable that socialist trade-unionism accepted the collective agreement very quickly. In England there was hardly any opposition; in Germany a very great majority accepted a resolution which strongly recommended establishing collective agreements as early as 1899 in the third congress of German trade-unions, held at Frankfort.

Since that time the development of collective agreements has assumed enormous proportions in England, Switzerland, Germany, the Netherlands and the Scandinavian countries. In Germany this development was temporary interrupted by the nazist revolution, and though conditions in the field of labor law are not yet quite surveyable, there is no doubt that the general trend is in the direction of a re-establishment of the collective agreement.

The advantages of a collective agreement may, as far as I can see, be summarized in four points. It should be seen in the first place, as evidence of the employers' recognition that, in settling wages and other labor conditions, the workers have rights equal to theirs. Co-operation between employers and laborers has stimulated a greater harmony in the same industry.

In the second place it brings about stability in labor relations so that labor conflicts are avoided and a regular process in production is promoted.

Thirdly, although it maintains its civil law character and expires periodically, it does, however, have a strongly durable character, for where once labor relations planning has been begun by means of collective agreements, co-operation between employers and workers toward agreement, as a rule, continues.

Finally, it has vigorously strengthened the confidence of the workers. Through the collective agreements they have learned how it feels to have a share in the responsibility and to be able to reach something. Numerous collective agreements have grown to be real law-codes, in which not only fair wages have been established but also old-age-pensionfunds, improvements of the rules of dismissal, vocational training, organs of co-operation in the undertakings and holidays.

6. With the introduction of the collective labor agreement and the reform of the right of dismissal, we have already partly taken leave of the field of material benefits for the worker, and have shifted to that of the structural reforms of social life. Along with the material improvement of the worker's position, the need for farreaching changes in the social structure has been aimed at by the Christian social movement.

It must be understood, however, that the struggle for new forms of society could not be vigorously carried out until now. But today the sorest material needs of the laborer, at least in Western Europe, have been met. That is why it is possible now, more than before, to draw the attention to the great evil of capitalistic development: the fact that the worker no longer bears any responsibility of his own in the process of labor, and consequently has been alienated from his labor and from the community in which he performs this labor. This state of affairs now constitutes the heart of the social problem.

Different causes that effected this state of affairs can be mentioned. Though we may surmise, according to several researches (e. g., the Robert Hoppock and the Hawthorne one), that the percentage of workers that have a positive aversion of their work is relatively small, yet it is a fact that modern techniques with their strongly sustained division of labor and their mechanization of production, have spiritually estrangeld the worker from his labor.

Besides, there is the fact that the spirit of capitalism, with its unlimited stimulation of self-interest and with its scorn of all moral considerations in the economic sphere of life, has had its destructive influence on the working classes. Countless workers have learned the doctrine of unrestricted self-interest from their employers and how they did learn it! Then there was, in addition, the fact that society was not prepared to help the working man to utilize his leisure properly when shorter working-hours were realized. This will suffice to outline the causes of the spiritual proletarisation of the working-classes.

It is especially to fight this spiritual proletarisation that the Christian social movement propagates industrial democracy both in industry and undertaking, in the social and economic fields. The Christian social movement has adopted as its principles: harmonious co-operation of capital and labor. One of these two factors should not overrule the other; together they bear the process of production and that is why they should also bear the responsibility for its progress together.

The idea of co-operation on the basis of equality inevitably leads to the idea of industrial democracy. A worker is no part of a machine, but a man, created by God and placed in this world with his own responsibility towards God, his family and the several communities in which he has his task. In the social order he should find no hindrance to the acceptaince of this responsibility.

A worker in these days is exposed to the temptations of a system which promises him an almost unlimited improvement of his material position but which, at the same time, — not to mention the question of the possibility of realizing the material promises, — tends to make him a slave of the totalitarian state. Resistance to this demonic system is, in my view, only possible if the Christian social movement right now vigorously sponsors such structural changes in the social system that the worker regains his dignity as man, bears for his part responsibility in the regulation of economic life and in doing so realizes again the significance and purpose of his labor. In opposition to the brutal destruction with which communism threatens this world, all those who recognize Jesus Christ as Lord of their life and of the world have the duty to show that the criticism of the Gospel on our social order is far more radical than the communistic criticism and that a real recovery and a real renovation of the violated social relations is not to be attained in any other way than by obedience to the Lord's commandment.

Therefore, industrial democracy is necessary in the national economic policy, in the economic relations in industry and especially in the undertakings. For a worker carries out his work there; he spends the greater part of his life within its boundaries; it defines his circumstances in life preponderously. Therefore Hedemann was right when, in an essay on "Betriebgemeinschaft als Rechtsproblem", he said: "Die wirklich das Materielle des Arbeitsverhältnisses betreffenden Probleme haben ihren Sitz im Betriebe as solchen" (the problems concerning the essential side of labor relations are situated in the undertaking as such).

That is why the management will have to inform the works council about the running of the undertaking; the council will have to be allowed to discuss it with them to its full extent and have a right to give advice and to make proposals which may attribute to technical and economic improvement. For the time being, I should not dare to give works councils more powers than these. The limited school instruction which most of the workers have received will render the execution of even these rather simple qualifications difficult enough. It will be necessary to start intensive training of those who, in the future, will take their places in the works councils.

This temporary restricted industrial democracy in the undertaking will, in the long run, grow out to a right to co-determination regarding features that are all-important to the continuation of these undertakings. There is not any justification for the fact that now the management of a undertaking takes unilateral decisions on those questions without being responsible to anyone. It is my conviction that a development of industrial democracy in the undertaking will be possible if we succeed in impressing the importance of these matters on the trade-unions' membership and in training a sufficient number of them in economics, social ethics, sociology and labor-law.

7. I am quite aware of the multiplicity of the problems which I have just raised. I think, however, that I should not do justice to my subject if, finally, I did not pass the frontiers of the Western European and Scandinavian countries. Since the beginning of 1948, there has been an Indonesian settlement of the International Federation of Evangelical Worker' Associations in Djakarta.[3]) In establishing this, the Christian labor movement has been involved in the great spiritual and social struggle which is being waged in the Far East.

It is obvious that communism, without giving up hopes to conquer Europe, now directs its attention for the greater part to Eastern Asia. It is equally obvious, that the pauperized and downtrodden multitudes in China, India, Pakistan, Siam and Indonesia must lend a willing ear to the many communist promises of wealth and material expansion.

The Danish ex-minister Arne Sörensen has written a series of articles in the Netherlands weekly "Vrij Nederland" on the Bangkok-congress of the World Council of Churches. Among other things he points out that the rumors of a fantastic industrial development in Asiatic Russia have made a strong impression on the East of Asia. "If a person wants to avow his anticommunism in Asia", he writes, "it is not sufficient for him to say that Russia is governed dictatorially — *for the Asian countries have never known democracy* — nor will solemn declarations have any effect — his only conclusive force will have to be derived from *tractors, electrification* and *schools*, exactly the same things Lenin advocated zealously. The thing that made the deepest impression on the intellectuals of Asia was that since 1917 the Russians have taught a hundred million people how to read and write".

If we want to check communism in Eastern Asia, the pooling of the powers of Western Europe and America there together with the young independent states in the South East of Asia will be necessary. But in no lesser degree a positive contribution of America and the West to the solution of the social problems with which the East is struggling is necessary. Raising our own standards of living will have to be postponed to show the East that *in the struggle for solution of the social problems the Western world really wants to serve the East.* Therefore the plan of Mr Truman "Point Four" and the Spender-Colomboplan deserve our great attention and support.

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[3]) The International Federation of Evangelical Workers' Association was founded in Düsseldorf (Germany) in 1928 and comprises Christian trade unions in the United States of America, the Netherlands, Switzerland, Denmark and Germany.

Information about the I.F.E.W.A. give the messages it directed to the Conference of the Lutheran Worldfederation at Lund (1947) and the First Assembly of the World Council of Churches at Amsterdam (1948). Copies of these messages are available at the secretariat of the I.F.E.W.A., 43—45 Stadhouderslaan, Utrecht, Netherlands.

The Christian trade unions in the United States of America are united in the *Christian Labor Association*, 1049 Grandville Avenue, S.W. Grand Rapids 9, Michigan.

Is it necessary now to demonstrate at length the importance of that small settlement of the I.F.E.W.A. in Indonesia? Is not the message of Christ's Kingdom over the whole of human life conclusive for the establishing of social order in Asia too?

8. The multifarious tasks with which the Christian social movement finds itself now confronted sometimes oppres us when we consider our small numbers in our own country and in the world at large and, worst of all, our weak strength and our weak faith.

What encouragement, however, we find then in the word of our Lord. "My father worketh hitherto, and I work" (John 5 : 17).

W. F. DE GAAY FORTMAN.

SCIENCE AND RELIGION IN THE SEVENTEENTH CENTURY

ISAAC BEECKMAN (1588—1637)

Three centuries ago, as the American sociologist prof. R. K. Merton says, "the Protestant ethic had pervaded the realm of science and had left its indelible stamp upon the attitude of scientists towards their work". The influence of the Reformed religion was not restricted to ecclesiastical, political and pedagogic matters but bore fruit in every department of culture, art (Rembrandt, Revius, Bredero, Milton) and science not excepted, and the "ministers of the Divine Word" stood in the first rank of the protagonists of the cultural movement: one has only to remind a scholar and poet by God's grace like Jacobus Revius, (1586—1658) a geographer and heroic preacher like Petrus Plancius (1552—1622) and an astronomer and mathematician like Philippus Lansbergen (1561—1632).

The chandler, candidate for the ministership and elder of the Reformed Church, scientist, doctor of medicine and headmaster Isaac Beeckman (1588—1637) certainly belongs to these great men from the "Dordrecht period". His importance as a scientific thinker is more and more recognized. In his thesis for the degree of M.D. (1618) he enounced the principle of inertia and on the same occasion he gave the right explanation of the ascent of water in a pumptube by the pressure (not the weight!) of the air of the atmosphere [1]). He, (not Galilei), was the first to give a dynamical deduction of the law of falling bodies [2]) (1614, 1618). His great modesty prevented the printing during his lifetime of the scientific notes which he wrote down from 1608 till 1634, partly in Latin, partly in his native Netherlandish language [3]). Nevertheless, his influence was exerted by oral communication to his many friends and pupils; the diary was read by Descartes, Mersenne (1630) [4]) and Hortensius (1634) [5]). His brother, Abraham Beeckman, edited part of the Diary in 1644, but then the development of science had already made it relatively unimportant. Moreover the edition must have been very limited, as there is left only one specimen of it nowadays. Accordingly Beeckman's work fell into almost complete oblivion. In 1878 the Provincial Library of Zeeland bought the original manuscript of the Diary for half a guilder, because it had been written by a Zeelander. In this Library it was discovered in 1905 by Mr C. de Waard, who knew its importance. In World War II, which devastated the beautiful island of Walcheren, it has been heavily damaged, but happily the ,,Hollandse Maatschappij der Wetenschappen" had ordered it to be copied and Mr de Waard had already done further research in archives, which for the greater part are destroyed now [6]).

Isaac Beeckman was born at Middelburg (isle of Walcheren, in the Netherlandish province Zeeland) from a family of Flemish refugees [7]). His father, Abraham Beeckman, was a manufacturer of candles and water conduits for breweries, aqueducts etc. With his younger brother Jacob, Isaac Beeckman went to Leyde to study theology (1607). In the mean time he also found occasion to go for some months to Rotterdam to learn mathematics and nautics and to stay for some time at Amsterdam (1608) to learn Hebrew from the brownist refugee Henry Ainsworth [8]). In Leyde Beeckman met with Rudolph Snellius (1609), who taught the Optics of Ramus and with his son Willibrord Snellius [9]), the discoverer of the law of refraction, who taught astronomy.

Back in Middelburg (1601) Isaac does not go out preaching, but he turns apprentice in his father's business and afterwards settles on his own account as a chandler at Zierikzee (isle of Schouwen) (1611), where he lives with his brother Jacob, who was conrector of the latin school [10]).

In those times a university graduate carrying on a manual trade was not considered as degrading himself. The expression of the wedding service of the Reformed Church, admonishing every husband to be diligent in his ,,divine calling" was no hollow phrase then; to be a theologian was not thought more ,,godly" than to be a chandler. In the fresh bloom of the Protestant culture manual labour still was an honour and a joy and accordingly Beeckman kept a lively interest in the ancestral profession.

At the same time he does not neglect theology, for in 1612 he stays for some months at the huguenot academy of Saumur [11]) and in 1613 he is accepted as "proponent to the ministry". However he never got a position as "minister of the Divine Word"; the name of Beeckman had a not too good reputation in ecclesiastic Zeeland, because his father had strongly opposed the practice of baptizing children of Romish parents [12]). Thus Isaac Beeckman continued to be a chandler at Zierikzee, but his "divine calling" gave him every day fresh incentives to scientific research. He occupies himself with ameliorating the manufacture of candles and pumps and with problems of aqueduction [13]). In 1616 he gives his business to a cousin [14]) and follows his brother Jacob, who had been appointed "rector" (i. e. Headmaster) of the latin school at Veere (isle of Walcheren). Henceforth he has more leisure to devote himself to science, and amongst his other occupations he makes astronomical observations for his father's friend, "Dominus" Philips van Lansbergen [15]), who lived at Middelburg, exempted from ecclesiastical duties by the munificence of the States of Zeeland [16]).

A minister of the Word (a reformed "dominee") occupying himself with astronomy and a chandler addicted to theology are not at all queer phenomena in that period. The Reformation not only gave to every believer the right and even the duty to read and to try to understand the Book of Holy Scripture, but moreover it imposed the duty of reading and of trying to understand the Book of Nature. Natural science was no longer an affair of a few adepts; it was the task of every man to glorify God by direct investigation of His creation [17]).

In 1618 Isaac Beeckman obtained the degree of doctor of medicine at the University of Caen [18]). In this same year he got acquainted with the great philosopher and mathematician René Descartes (1596—1650), then an unknown young man of 22 years, studying at the military school at Breda. Beeckman and Descartes were reading a poster in which a mathematical problem was proposed. Beeckman translated the problem from Netherlandish for the foreigner and this was the beginning of their friendship. Descartes owed much to it. "I slept", he wrote afterwards, "and you awakened me" [19]) and he testified that he never before met a man who so tightly connected physics with mathematics [20]).

The Synod of Dordt (13th Nov. 1618—9th May 1619) expurgated the schools of Arminian influences and so Beeckman's friend Antonius Aemilius was appointed "rector" of the latin school at Utrecht. For a short time Beeckman joins him as conrector (Nov. 1619—Dec. 1620) [21]), but when his brother Jacob has been appointed to the headmastership at Rotterdam, he follows him thither to share salary and work without an official appointment [22]). Henceforth he has to teach logic, but that does not hinder him in his relations with the astronomer van Lansbergen and the cartographer Willem Jansz Blaeu [23]) (1571—1638). Meanwhile he does not forget his old trade; now he is at Middelburg, then at Veere to lay water conduits and when the dikes are broken he goes to Schoonhoven and Gouda (South-Holland) to give advice to the magistrate of town and polder [24]). The burgomasters Puyck [25]) and van Berckel [26]) (tradesmen and merchants themselves!) often ask his opinion on technical improvements of navigation [27]), on construction of mills and on drainage [28]). With the mathematician Stampioen and the physician Fornerius he even founds a "Collegium Mechanicum" [29]) (Aug. 1626), which once a week deals with scientific problems and gives gratuitous advice on technical matters to the burgomasters.

Science did not, in academic pride, stand aloof of daily life. According to the Reformed ethics its first aim was "to glorify God' 'and its second aim to serve to "the benefit of the commonwealth" („het nut der gemeensaeck"). Simon Stevin (1548—1620) was the luminous example. In the service of the Prince-Stadhouder Maurice of Orange he used his mathematical talents in planning fortifications and harbours and in solving problems of drainage and of book-keeping and on purpose he wrote in the mother-tongue to break the sterile isolation of science from daily life. Not without reason the English bishop Sprat afterwards warns his compatriots that "the English always were averse from admitting of new Inventions, and shorter ways of labours . . . both which are the fatal mistakes that have made the Hollanders exceed us in riches and trafic: they receive all projects . . ." [30]) and he urges them "to reflect on the temper of the Spaniards . . . how unfit the Spanish humour is to improve Manufactures . . . they commonly disdain to exercise any Manual Crafts, and permit the profit of them to be carried away by strangers" [31]). Indeed it were not only the statesmen and admirals who won the war against Spain: the peasants who cultivated the land, the engineers and mill-wrights who drained it, the ship-builders, geographers and mathematicians who pushed the navigation ahead of that of the rivalling nations, the technicians and physicists who developed the industry, all of them made the war economically possible, all of them were animated by the religious enthusiasm preached by their "dominees", by a doctrine which inspired love for mechanical arts and which, reversely, depended for its maintenance on these same arts. Also from this point of view Sprat was right in saying that "invention is an heroic thing" [32]).

The curiosity after the secrets of the world, which drove the Hollanders over the globe, had taken possession of Beeckman too and besides he felt the need of serving the young republic by his ability in mechanics.

In their hard struggle for religious and political freedom the people of the Low Countries had to make up by quality what they were lacking in quantity; this practical reason, beside the religious motive, made the improvement of handicraft and a democratic vulgarisation of science necessary things. Therefore Beeckman, when headmaster in Dordt, will project a series of lectures on physics, which "to the benefit of carpenters, bricklayers, skippers and other burghers" [33]) will be delivered in the Netherlandish language and afterwards he thinks it even a duty of the magistrates to organize the teaching of natural science and mathematics for its citizens, instead of restricting themselves to the maintenance of latin schools [34]).

In 1627 Beeckman was appointed ,,rector" of the Latin School at Dordrecht. Under his management this institution flourished as never before or thereafter. There were about 600 pupils and it was considered to be the best school of the United Provinces [35]). The common people ascribed to their Rector supernatural faculties [36]); the rumour went (though Beeckman himself rejected astrology [37]) that he had predicted from the stars a great fire at Dordrecht [38]) and that by his telescope he had seen that the ship ,,de Oranjeboom", which had been given up as lost, had unloaded in Bresil [39]).

The greatest of the contemporary scientists travelled to Dordt to meet him. By mediation of the celebrated Reformed theologian André Rivet he received Gassendi (1592—1655) (who called him ,,the best physicist I met hitherto") [40]) in 1629 [41]) and Mersenne (1588—1648) in 1630 [42]) and afterwards he continued correspondence with them. Descartes, who soon afterwards established himself permanently in Holland, payed him a visit in 1628 [43]) and again in 1629. His many-sided interest was satisfied by his conversation with the burgomaster Jacob de Witt, the dominees van Buytendijck and Kolff, the physician Johannes van Beverwijck and the Pensionary Jacob Cats (whom he knew from Middelburg, where common interest in drainage joined them).

The Town Magistrate gave him an observatory ("myn toorentjen") [44]) which became the first meteorological station in Europe (1628). Here he registered the winds, the rainfall, the temperature and made astronomical observations with his former pupil Hortensius and especially with his friend, Ds Andreas Colvius (Kolff).

Colvius[45]) (1594—1671), who had been "minister" of the Embassy of the States-General at Venice and had made friendship with Paolo Sarpi (Galilei's friend), was much interested in mechanics and natural science. He possessed a rich cabinet of curiosities of nature, and he introduced the modern scientific ideas from Italy (e. g. those of Galilei) to Beeckman[46]).

Religion, literature, technique and science are no contrasts in this circle, but they are closely interwoven by a common view of life and world. The rich world, seen with "new" eyes, offers everywhere the most remarkable problems: when Beeckman is sipping wine with the Pensionary and poet Jacob Cats and when they see how the fluid is sucked up by the sugar lumps an animated discussion about capillarity immediately ensues[47]). Theology, poetry, music and the newest type of windmills are brought on the carpet too. Also didactical, pedagogical, psychological and social problems occupy him; he ponders on the task of a rector[48]) as well as on the best way of regulating production in trades (of course the examples taken from his old craft) and of imposing taxes[49]). Only political questions are never touched. Returning from divine service Beeckman writes down his acute and expert remarks: theological, exegetical and linguistic about the sermon, musical about the psalmsinging of the congregation, and he regrets that, against his will, the pattern of the churchwindows draws his attention to mathematical problems[50]). The pages of his diary prove that science and religion were an integral part of the everyday life of the merchants, tradesmen and ministers of Holland in her Golden Age.

Beeckman had many pupils who got a name in later life. At Rotterdam Frederick Stevin, the Teellincks (famous preachers), Martinus van den Hove (Hortensius, an astronomer who became a fervent disciple of Philips van Lansbergen), George Ent (1604—1689) (the friend of Harvey and the defender of Harvey's discovery). At Dordrecht: Jeremias de Decker (the poet) and Johan de Witt (the great statesman who also got a name in mathematics). Having finished his academic studies, George Ent came back from England to Beeckman[51]) (1627) to be introduced by him into the "modern" science, which had not yet penetrated into university teaching. So Beeckman influenced one of the first members of the Royal Society.

However, Beeckman was not at all exempted from sorrow. The reading of Beeckman's diary will bring the reader into such a close contact with a burgher from the Dordrecht period, that he will understand that the baptism service of the Reformed Churches with its pessimistic saying that "this life is nothing but a continual death" only stated a hard reality to its auditors. The plague raged with short intervals: in 1636 there were 3000 casualties in six months in Dordrecht with its 18000 inhabitants [52]). Phtisis also made many victims; Isaac's brothers Gerson († 1624) and Jacob († 1629) died from it [53]). The death rate of children was exceedingly high and Beeckman, who was such a loving father, was repeatedly heavily tried; he lost five little sons (1621, 1622, 1627, 1629, 1632). Moreover at the background there was a constantly looming danger, because Holland's existence was still menaced by Spain. Notwithstanding all these troubles they went through, the Hollanders of the 17th century, who were so much more familiar with death than modern men, yet understood the art of enjoying life much better. The continual menace of death did not make them melancholy and did not lead them to a "flight from the world". On the contrary, it made them accept every new day as a divine gift. The same tranquillity and equilibrium of mind that strike us when beholding the portraits in the Rijks Museum, meet us when reading Beeckman's diary.

Isaac Beeckman is not a sturdy man like his friend, Ds van Lansbergen or like his brother Jacob. He is shy [54]); when he sees an acquaintance he makes a detour to avoid a meeting [55]); in society he only speaks hesitatingly [56]); he has a tendency to give up his opinion for that of his opponent; he hides behind his stronger brother Jacob [57]); he complains of weakness of faith [58]). Notwithstanding all this he has a strong character and he understands the difficult art of living well. He has a great love for liberty; he declines an official nomination at Rotterdam because he would be bound too much in that situation [59]); an appointment as headmaster at Brielle is rejected, although it would bring large pecuniary profit [60]), as he does not wish to leave his brother's company; he never exercised medical practice because he did not like to be summoned by everybody [61]).

In his religious attitude too he manifests his independence. He is a convinced contra-remonstrant: his nomination at Utrecht in 1619 and his opposition to the wedding of his sister with his friend Justinus van Assche, who had chosen the Arminian side, are sufficient proof fort it. *). He is always mild in his judgment, but he makes the acute remark that the Remonstrants are very tolerant as long as everybody will join them [62]. At the same time, however, as an elder of the church of Rotterdam [63], he pleads for a moderate policy in church. His pronounced calvinism taken into consideration, this attitude does not result from indifferentism but from genuine tolerance (which only receives its meaning from a strong personal conviction).

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*) His diary gives unequivocal proofs of his uncompromising calvinism. On the list of recommendable books he puts the works of Calvin immediately after the Holy Scripture [64]) and he gives numerous quotations from Calvin's

His serenity of mind as well as his thoroughly scientific outlook are clearly shown when the family disease is undermining his health. He controls the progress of the disease by weighing himself and he notes the decreasing figures in his diary. His brother Abraham added: "died the 19th of May, anno 1637, from consumption, being about fifty years old" [68].

One of the first of Beeckman's scientific conceptions is the principle of inertia which to him is one of the fundamental ideas of mechanics. This principle, which has an aprioristic character, is indeed indispensable for the development of this science. It was posited already in 1613 [69] and again in 1614 [70]. "What once moves, moves always, if it is not hindered". It turns out however that Beeckman's conception includes this principle not only for rectilinear movement but also for circular movement [71]. Galilei's conception was still less "modern": an interesting example that scientific ideas do not rise in full armour from the heads of their fathers.

Of course Beeckman knows that bodies are thrown off from a turning wheel, but the subterfuge of the influence of the air is ready at hand [71a].

Beeckman elaborated a theory leading to the correct law of falling bodies. He combines the idea that in equal times gravitation must have an equal influence on the increase of velocity with the principle of inertia, which affirms that an once acquired velocity will be preserved; thereby he was the first to deduce uniformly accelerated motion from a constant force [72]. In the mathematical deduction the attraction by the earth is conceived to be discontinuous [73]: "it pulls with little jerks" („sy trekt met cleijne hurtkens") [74].

Explaining the ascent of water in the pump tube he combats the

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Institution and Commentaries. He accepts the Reformed doctrine of "certitude of salvation" by testimony of the Holy Spirit in our heart [65]), also when he is reflecting about himself [66]). He is even interested in minor theological issues; in the difference between Rivet and Gomarus he takes the side of the first named when conceiving the sabbath as belonging to the ceremonial law [67]).

"horror vacui" [75]) and ascribes this phenomenon to the air [76]). In the corollaries of his doctor thesis of 6 Sept. 1618 he openly defends this explanation and also the idea of a vacuum [77]). Against the objection that, when a lid is put on the well, the weight of the air would not press, Beeckman replies that the air in the cistern has an expansive force which is equal to that counterbalancing the weight of the column of air outside [78]). He even tried to find the relation between pressure and volume of a certain quantity of air but he did not find exactly "Boyle's law" [74]).

These examples may suffice to demonstrate that Beeckman is an early exponent of the new experimental mechanics and physics. In medicine he is immediately ready to accept Harvey's discovery (publ. 1628) of the circulation of the blood (which he knows through George Ent) if it can be proved by experiment [80]).

Moreover he is also a pioneer of modern scientific thought in general. The boldness of his conceptions, however, is combined with a critical disposition towards them, for he is not at all blind to the weak spots in the doctrines he adheres to.

In 1608 he already accepts the possibility of the diurnal rotation of the earth, following Simon Stevin [81]) who shortly before defended the Copernican system in his ,,Wisconstighe Ghedachtenissen" (Leiden 1608). In 1613, however, he still seems to believe the annual motion of the sun [82]), which then serves as an example of the inertia of circular "natural" movement. Beeckman is perfectly aware of the fact that the "new" astronomy may be probable, but is not yet absolutely certain: he thinks that the phenomena of heaven might be conciliated with different astronomical hypotheses [83]). Accordingly one time he will use the geocentric hypothesis [84]) and another time he gives explanations alternatively on both suppositions [85]). In the beginning of 1618 [86]) he speaks of the motion of the sun, later on in this same year he alludes to both possibilities [87]) (movement of the *sun* and of the *earth*), in December he expounds only the diurnal and annual motion of the *earth* [88]) and afterwards he goes on using exclusively the Copernican hypothesis, though always with a reservation [89]) and without denying that the contrary, ptolemaic, hypothesis may also save the phenomena [90]). According to him the decision ought to be an experimental one. When Ds Colvius communicates to him Galilei's theory of the tides [91]), Beeckman is very much impressed. If it were true it would be a strong argument for Copernicus and therefore Beeckman proposes to make a mechanical model to try it [92]). This is a wholly modern attitude: however much he prefers this hypothesis to the Ptolemaic one, he does not decide categorically in favour of Copernicus, because experimental evidence is still lacking.

Beeckman is almost free from the constraint of philosophical systems. The platonic prejudices of Copernicus and Kepler about the "beauty" and "dignity" and "simplicity" of the heliocentric system are of no value to him [93]). When in 1629 he discusses Kepler's work [94]) he has no aesthetic objections against the elliptical orbs but he only opposes the nonmechanistic principles by which Kepler explains the movement of the planets [95]). He condemns Gilbert's and Kepler's opinion that the earth possesses a soul (feeling, understanding) as absurd and unworthy of a scientist [96]).

He contends that, ascending from phenomena to their explanation by different hypotheses, the divergence increases the further we go back [97]). This points to the fundamentally inductive character of Beeckman's method, for from the deductive point of view different hypotheses would lead to divergent *"phenomena"*. Indeed with Beeckman hypotheses are mainly plausible illustrations of possible mechanisms and certainly no dogmas.

Beeckman is unbiassed by aristotelian prejudices (at Christmas 1631 he had not yet read Aristotle [98]). Therefore he does not bother about the "essential" difference between incorruptible heaven and always changing earth but thinks that the planets might have their origin from exhalations of the sun [99]).

He asks soberness in theorizing and rejects all animistic and all merely verbal explanations. That's why he shows a predilection for mechanistic explanations: "I do not admit anything in philosophy that might not be represented by a "sensible" imagination" [100]). Accordingly Beeckman is one of the first revivers of corpuscular theory, quite independent of Gassendi, Descartes and David van Goorle [100a]) (1591—1612). He seems to be inspired by the ancient engineers (Hero, Vitruvius), by Asklepiades of Bithynia (whom he knows from Galen) and by Lucretius.

As atomism found its origin in ancient materialism ,the application of it, even when only restricted to physical theories, was abhorred by most philosophers of his time, the more so because Aristotle, who was the great authority of scholasticism at the beginning of the 17th century, had been its violent opponent. In 1624 Etienne de Claves, Jean Bitaud and Antoine Villon were banished from Paris upon pain of death if they returned, because they intended a public defence of atomistic theses i. e., of "scandalous", "temerarious", "dangerous novelties" [101]). At that time Beeckman had already based his physical theories on atomism for a long time (since 1614) and none of his Reformed friends was ever shocked by it, neither André Rivet (one of the most influential theologians of that period) nor Jacob Cats (whose poems came next to the Bible in the estimation of the common people).

However, here again Beeckman is careful not to fall into a dogmatism by which other mechanicians, like Gassendi and especially Descartes, would be enticed later on. He does not deduce phenomena from the atomic hypothesis with an absolute certainty. Atomism gives aposteriori a *possible* explanation of facts and Beeckman is ready to abandon every explanation for another one, provided it be mechanical. In this last respect he assumes the attitude which would prevail in physics from Boyle up to quite recent times.

In this manner he is one of the earliest adherents of the mechanical and mathematical method in natural science, a method which was soon to win a complete victory by the work of Descartes, Boyle, Huygens and Newton.

Still later on corpuscular theory would show a tendency to fall back into the materialism which was connected with Greek atomism. In Beeckman's conceptions, however, there is no trace of this new synthesis of materialism and atomic theory. On the contrary, the divorce has just been proclaimed and there is no conflict between his religion and his science. To him atomism is only a physical hypothesis and no pseudoreligious dogma; accordingly he rejects the eternity of atoms and he rejects too that things are made by chance and never even mentions an atomistic conception of the human soul.

The discovery of natural causes does not weaken his religious faith. According to Beeckman we ought to thank God also when a favourable event happens by *natural* means: "For God is the author of nature herself. And in this respect one should ascribe to Him all good and important things, whether one could predict them or not, whether one does them himself or not" [102]). Is is understandable that these problems are occupying him especially during or shortly before the Dordrecht Synod [103]).

According to Beeckman God created the atoms and gave them motion [104]) and thus all things happen by His providential design, following the laws He put into matter [105]). Given these religious premisses Beeckman in his physics never refers to a miracle when he is at his wit's end. E. g. he will not be satisfied by saying that God *created* the planets, but he looks for a possible mechanism [106]). Only the creation of Man after God's image is excepted [107]). For the rest Beeckman sees that Man has a tendency to call natural phenomena "miraculous" only as long as he does not know their causes [108]).

Of course this does not mean a fatalistic determinism: "For God is so wonderful in His providence that He makes natural things conform to human action" [109]). Consequently Beeckman clearly recognizes that science and theology look upon things from quite different angles. Science has the task to proceed from wonder to non-wonder, to reduce all strange things to known things, but theology has the task to go from non-wonder to wonder: "the more we understand God's reign the more glorious and wonderful it is" [110]).

Beeckman gives sagacious explanations of a multitude of phenomena (magnetism, gravitation, refraction) with the help of atoms, pores and vacuum, but he is aware of the fact that his theories are not rigorously proved. Evidently he is convinced that there is a lot of truth in corpuscular theory but that does not make him lose sight of its weaknesses.

He frankly confesses to have "an argument against atomists and accordingly against myself" which is irrefutable [111]). The absolute solidity of atoms excludes their resilience after collision, because a true atom cannot be compressed, is inflexible and consequently will never be reflected [112]). "As, however, reflection is indeed observed in an infinite multitude of phenomena, it seems that the doctrine of atoms is fundamentally overthrown by these phenomena" [113]). Beeckman wishes to cling to these *phenomena* of elasticity and flexibility. He states that at least the secondary particles (having pores) might possess these properties at all events [114]). Moreover he acquiesces in accepting non-rational principles, viz flexible primary particles, whose properties are unintelligible to human reason [115]). He admits them only reluctantly, but he wants them to explain e. g. the rarefaction and compressibility of the air, for he abhors the scholastic explanation of these phenomena as being even more incomprehensible [116]). Evidently he wants, like Gassendi, a theory that is comprehensive and satisfies the imagination [117]), but he does not fall, like Descartes, into a self-satisfied rationalism.

If this marvellous insight in the real state of affairs had non been lost, the pseudoscientific crude materialism of the 19th century could not have proclaimed its atomistic dogmas so noisily with so much success. One of the few opponents of the atomistic philosophy then unwittingly repeated Beeckman's argument in maintaining that the concept of an absolutely hard atom endowed with a perfect elasticity presents „one of the most fatal embarrassments of the mechanical theory" [118]).

Isaac Beeckman is a shining example of a scientist who knows the limitation of science. On the other hand he is a historical proof of the fact that orthodoxy and scientific endeavour are not so wide apart as some modern historians will make us believe. His Reformed persuasion did not impede him to devote himself to scientific problems; on the contrary, it drove him (and his friends, like Lansbergen and Colvius) towards them. It did not hinder him to accept modern doctrines (the circulation of the blood, the heliocentric system and the atomic theory) that seemed dangerous and irreligious to the conservative; on the contrary, genuine orthodoxy means indeed a yearning for truth and an opposition to narrowminded contortion of reality. It also taught him to be careful not to exchange only human "religious" prejudices against only human "scientific" prejudices and to submit in science solely to the facts revealed in *God's* creation. This was the secret which gave him and his contemporaries the boldness to scrutinize nature without being hindered by prejudice, this was the divine bond which made them free from human ties.

R. HOOYKAAS

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1) C. de Waard, L'expérience barométrique, Thouars 1936, p. 80.

2) G. Milhaud, Descartes savant, Paris 1921, p. 28; E. J. Dijksterhuis, Val en Worp, Groningen 1924, p. 310.

3) Journal tenu par Isaac Beeckman de 1604 à 1634, publié avec une introduction et des notes par C. de Waard, La Haye 1939, 1942, 1945. The fourth volume (with register) is still lacking, which lessens the serviceableness.

4) Journal, vol. III, p. 160.

5) III, 354.

6) Vol. I, Note sur le manuscrit.

7) Biographical dates from „Vie de l'auteur", vol. I, p. I—XXIV.

8) I, 217. 9) I, 21, 105; III, 306. 10) I, 217. 11) I, 217; III, 4. 12) vol. I, p. V, VIII. 13) I, 80. 14) I, 218, 219. 15) I, 106.

16) Philips Lansbergen, Bedenckingen op den dagelijckschen ende Jaerlijckschen loop van den Aerdt-kloot. Middelburg 1629. Opdracht aan de Staten van Zeeland.

17) R. Hooykaas, „Robert Boyle", een studie over natuurwetenschap en christendom, Loosduinen (1943) p. 65.

18) I, 215, 217, 218; III, 123.

[19] G. D. J. Schotel, De illustre school te Dordrecht, Utrecht 1857, p. 71.

[20] I, 244 (1618): Hic Picto (viz Descartes!) cum multis Jesuitis aliisque studiosis virisque doctis versatus est. Dicit tamen se nunquam neminem reperisse, praeter me, qui hoc modo, quo ego gaudeo, studendi utatur accurateque cum Mathematica Physicam jungat. Neque etiam ego, praeter illum nemini locutus sum hujusmodi studii.

[21] II, 1. [22] II, 152. [23] II, 199. [24] II, 284. [25] II, 350, 353, 355; III, 13. [26] III, 450. [27] II, 350, 361. [28] II, 357—359.

[29] II, 429, cf. II, 249. The scheme dated from 1623.

[30] Thomas Sprat, The history of the Royal Society of London for the improving of natural knowledge. 4th ed. London, 1734, p. 401.

[31] Sprat, op. cit. p. 383. [32] Sprat, op. cit. p. 392.

[33] II, 455: „tot gerieff van timmerlien, metsers, schippers ende andere borgers".

[34] III, 61 (1628): „haer borghers... doen onderwijsen in natuerlicke wetenschappen ende mathematische Konsten".

[35] Schotel, op. cit. p. 73. [36] III, 35. [37] III, 35, 215. [38] III, 215, 216. [39] III, 215 (1631). [40] De Waard, L'expérience barométrique, p. 85. [41] III, 123 (July 1629). [42] III, 160. [43] 8 Oct. 1628 (III, 94) and again in 1629. [44] III, 85, 112, 215. [45] III, 169, 199. [46] III, 171. [47] III, 317. [48] II, 375. [49] II, 302; II, 356. [50] III, 221. [51] III, 24. [52] I, p. XXII. [53] I, p. XVIII. [54] III, 220. [55] III, 219.

[56] Cf. however II, 364, where he is anxious to unmask a hypocrite.

[57] III, 220. [58] III, 215. [59] II, 152, 188. [60] II, 328. [61] II, 188. [62] II, 345 (1626). [63] II, 329.

[64] II, 341: „... post sacram Scripturam legatur Calvinus" (1629).

[65] II, 327 (1625). [66] III, 215 (1631). [67] I, 195, 223 (1618). [68] I, p. XXII.

[69] I, 24: Omnis res, semel mota, nunquam quiescit nisi propter externum impedimentum.

[70] I, 44: ‚dat eens roert, roert altyt, soot niet belet en wort".

[71] I, 253 (1618): „Id quod semel movetur, in vacuo semper movetur, sive secundum lineam rectam seu circularem, tam super centro suo, qualis est motus annuus". Also III, 103 (1629).

[71a] I, 253.

[72] I, 44)1614—15); cf. note 2 and Dijksterhuis, op. cit. p. 389.

[73] I, 261—262. An excellent commentary on this fragment has been given by Dijksterhuis (op. cit. p. 311) who contends that to Beeckman and not to Galilei belongs the honour of having given the first dynamical deduction.

[74] I, 264. [75] I, 26 (1613—14). [76] I, 46 (1614—15); I, 79 (1615—16).

[77] Already July-August 1618, I, 200. „Aqua suctu sublata non attrahitur vi vacui, sed ab aere incumbente in locum vacuum impellitur" and „Est vacuum rebus intermixtum".

[78] I, 200. [79] I, 142; II, 362 (1626). [80] III, 292, 297, 298, 312, 355, 445. [81] I, 1, [82] I, 24 [83] I, 3 (1610). [84] I, 10 (1612). [85] I, 101 (1616). [86] I, 167. [87] I, 200. The same in his thesis. [88] I, 253.

[89] II, 107 (1620); II, 169 (1620); III, 205 (1631): „... si Terra moveatur eo quo eam Copernicus modo moveri supponit".

[90] I, 344 (1619). [91] III, 171 (1630). [92] III, 206.

[93] Cf. R. Hooykaas, Het hypothesebegrip van Kepler. (Orgaan der Chr. Vereeniging van Natuur- en Geneeskundigen in Nederland, *1939*, p. 49 seq.).

[94] III, 99—106. [95] III, 103. [96] III, 17: „philosopho indignum". [97] I, 344. [98] III, 221. [99] III, 206 (1631).

[100] Nihil enim in philosophia admitto quam quod imaginationi velut sensile repraesentatur (La correspondance du P. Mersenne, T. II, 1936, p. 282—283; I Oct. 1629) éd. de Waard.

[100a] Exercitationes philosophicae, Leiden *1620*. Ideae physicae, Ultrajecti *1651*. Cf. F. M. Jaeger, Historische studiën, Groningen 1919, p. 51 sq.

[101] Joannes de Launoy, De varia Aristotelis fortuna in Academia Parisiensis extraneis hinc inde adornatis praesidiis liber. ed. sec. Hagae Comitum

1656, p. 73—78. R. Hooykaas, Het begrip element, Utrecht 1933, p. 190—193.

[102]) I, 229 (Oct. 1618): „Want God is autheur van de nature selve. Ende ten dien aensien moet men hem alle goede ende gewichtighe saecken toeschrijven, tsy dat mense vooorseggen konde oft niet, tsy dat mense selve doet oft niet". Cf I, 261 (Nov.-Dec. 1618). Cf. I, 138, 230. I, 261, Nov.-Dec. 1618): ‚Alsoo als eenen dief segt: „God heeft mij daertoe gepredestineert", hy liecht, omdat hy sichselven wys maeckt, dat hy door dit besluyt Gods niet schuldich en is in die dieverie.

[103]) I, 230 (Oct. 1618) (Providentia Dei et libertas hominis); I, 145 (Deus respectu Dei videtur autor peccati).

[104]) I, 132)1618. [105]) I, 23 (1614); II, 63 (1620). [106]) III, 206 (1631). [107]) II, 56. [108]) I, 341.

[109]) I, 261 (1618): Want soo wonderlick is Godt in syn voorsienigheyt, dat hy de natuerlicke dingen doet overeenkomen met die in der menschen actie bestaen.

[110]) II, 375.

[111]) II, 100 (1620): Argumentum contra eos qui atomos admittunt, atque adeo contra meipsum, objicio hoc, quod meo juditio tantum est ut ipse nequeam solvere.

[112]) II, 100: ...quod enim reflectitur, primum flectatur necesse est.

[113]) II, 101: Cum vero reflexio revera in infinitis propemodum rebus conspiciatur, videtur atomorum doctrina hisce funditus expugnata et eversa.

[114]) II, 101.

[115]) II, 157 (1620—1621): Constare autem hae atomi videntur quidem solidis fibris, sed quomodo flecti possint fateor me non intelligere.

[116]) II, 157. [117]) II, 102.

[118]) J. B. Stallo, The concepts and theories of modern physics, London 1882, p. 43.

NEWS ABOUT THE UNIVERSITY

INAUGURAL ORATIONS

On 27 October 1950 Dr A. Th. Knoppers took up his post as a professor of Physiology and Pharmacology in the newly established Faculty of Medicine with an oration on "Chemotherapy. Development and prospect" ¹).

On 27 October 1950 also Dr L. Algera entered upon his duties as a professor of Mathematical and Physical Sciences in the newly created chair of Botany, with an oration on "Temperature and Light as factors determining Flowering" ²).

Here follows a summary:

The higher plants pass through a certain number of stages during their period of development, namely the germination of the seed, the vegetative growth and the reproductive development. This reproductive development comprises the formation and development of the flower and the ripening of the seed. After the ripening of the seed the plant dies down, either entirely or partly.

The duration of this cycle is to a considerable extent determined by the moment at which the formation of the reproductive organs takes place and the rapidity with which the flower initial develops into a flower.

Both the formation and the further development of the flower are dependent on temperature and light.

Gaszner investigated the influence of temperature on the flowering-date of a number of annual and biennial plants. He came to the conclusion that with the biennial plants and also with the winter-forms of the annual plants the flowering is accelerated by a period of low temperature. Though a cold treatment is most effective during the germination, an application of low temperature in the later stages also stimulates the flowering.

By this susceptibility for cold the above-mentioned plants are characteristically distinguished from the summer-forms of the annuals, where this relation between low temperature and flowering-date does not exist.

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¹) *Chemotherapie. Ontwikkeling en perspectief.* Amsterdam, Scheltema & Holkema, 1950 (20 p.).

²) *Temperatuur en licht als bloeibepalende factoren.* Delft, W. D. Meinema, 1950 (18 p.).

By a great number of investigators (among others Lysenko, Purvis and Gregory) the cold treatment has been applied to agricultural and horticultural crops to shorten their period of vegetation. This method has become widely known under the name of the vernalization method.

The experiments of Garner and Allard have been of fundamental importance for a right understanding of the influence of light on flower production. They have proved that it is not the intensity of light which plays an important part here, but the duration of the daily exposure.

According to their response to the relative day-length they divide the plants in three groups:

First the short-day plants which are induced to flowering by a daily period of light shorter than 12 hours.

The second group of plants, the long-day plants come into bloom only when they receive light for more than twelve hours daily.

Finally there are the day-neutral plants which, as regards their bloom, do not respond to the length of the daily light periods.

By an artificial change of the natural light periods it is possible to change the normal flowering-date. It may be considerably accelerated but also retarded. This method is especially applied in actual horticultural practice.

The explanation of the phenomena described above is based on a hypothesis set up already by Sachs. Sachs assumed that the formation of the organs takes place under the influence of specific organ-producing substances or hormones.

Later investigators have succeeded in proving the existence of such substances. The action of temperature and light towards an accelerated flowering rests on an accelerated production of a flowering-forming hormone, through which the critical concentration required for the formation of the flowers is sooner reached.

Once formed, the further development of the flower is dependent on other factors, a. o. the amount of materials available in a form suitable for the synthetic processes.

This was proved for the bulbous plants. Their development takes place for the greater part at the expense of the reserve food stored in the bulb. It is chiefly present in the form of starch, which, however, is not in this form suitable for synthetic processes. Minute researches have shown that the conversion of the starch into sugars suitable for the plant, especially reducing sugars, is accelerated by the application of a low temperature treatment. The accelerated conversion makes an earlier flowering possible.

On 10 November 1950 Dr A. Stolk took up his post as a professor of Anatomy in the newly established Faculty of Medicine with an oration on "The Principle of Comparison in Medical Science" [3].

Here follows a summary:

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[3] *Het vergelijkingsprincipe in de geneeskunde.* Arnhem, G. W. van der Wiel en Co, 1950 (30 p.).

After a short introduction in regard to the part which the principle of comparison has played in practical life as well as in the domain of the various branches of art and science, the speaker passes on the principle of comparison in medical science. The theoretical views of the speaker with reference to comparative pathology serve as a starting-point [4]). In a lengthy argumentation it is made clear that in order to obtain a good insight in any given pathological process, it is essential that this pathological process should be studied with as large a variety of experimental animals in which this pathological process is operating as is possible.

After this four concepts are set up in comparative pathology viz. *the pathological type, the pathological series, the pathological homology* and *the pathological analogy,* in accordance with the corresponding concepts in comparative morphology and comparative physiology. The pathological type is the total aspect of a particular pathological phenomenon, as it is found with various species of animals, only the most general features being considered, while the special features are left out of account. Now the individual aspect never answers fully to the pertinent type. It is possible, therefore, parallel with the morphological series, to arrange corresponding pathological phenomena with different species of animals in pathological series, so that the terms of the series approach the pathological type more and more.

As regards the concepts pathological homology and pathological analogy, the following observations are made. Two pathological phenomena are, pathologically speaking, homologous, when they belong to the same pathological type but exercise a different pathological influence. As an instance of pathological homology may serve on the one side a benign tumour (as regards its structure), e. g. the meningiom, by its size and place in the cranial cavity appears to be lethal; and on the other side a tumour which need not be fatal. Another instance of pathological homology is afforded by the paralyses which are due to haemorrhages in the capsula interna, which may be of a very different character, dependent on the localization of these haemorrhages. As a third instance may be mentioned the coronal thrombosis with anginal symptoms characterized by a pain in the cardiac region; and the thrombosis of the vena portae, characterized by an enlargement of the milt, the formation of ascites, the origin of a collateral blood circulation and, in a later stage, also by haemorrhages in the gastro-intestinal canal.

Pathologically analogous are two pathological phenomena which belong to a different pathological type, but which nevertheless declare themselves in the same or in a similar way. Thus the morbid cellular growth of a tumour (proliferation) may be considered analogous with that of a ulcus (granulation). Other instances of pathological analogy are the rise of the bodily temperature, whether as the result of an infective disease, or as the result of a higher metabolism caused by a particular deviation of the thyroid gland, viz. Basedow's disease; further on the one side the paralysis which arises from a glioma, on the other side the paralysis which is caused by an extravasation of blood to the brain; finally symptoms of sciatica due to a nescritis of the nervus ischiadicus and the analogous phenomena arising from a hernia nuclei.

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[4]) A. Stolk, *Enige gevallen van gezwellen en ontstekingen bij poikilotherme Vertebraten. Een bijdrage tot de Vergelijkende Pathologie.* Arnhem, 1950.

In treating the methodology of comparative pathology distinction is made between the *method of correspondence*, the *method of difference* and the *method of specificity*. These methods may have an experimental as well as a non-experimental character. The method of correspondence makes use of laboratory animals which in systematic respect come nearest to man, and is on the whole made use of for practical purposes (the investigation of bacterial and virus diseases, the ascertainment of the toxic quantity of a poison, the determining of the desired dose of a remedy etc.). With the method of difference, on the other hand, the laboratory animal is, systematically speaking, as far removed from man as possible; the object of this method is as a rule purely scientific (the investigation of carcinomata occurring with fishes and reptiles, which investigation, when compared with the corresponding tumours of man, is of extreme importance in getting a clear insight in the nature and origin of these pathological deviations). In studying a pathological phenomenon by means of the method of specificity use is made of a laboratory animal which possesses this phenomenon to a high degree (carcinoma planocellulare of the lizard Lacerta agilis L. and skin carcinoma of the sword-bearer Xiphophorus hellerii Heckel, having for specific processes extreme horn formation and a strong increase of the melanophores). With this method of specificity most important results are reached.

For clinical practice, at last, the concept disease-type is elaborated, which denotes the total aspect of a particular disease as it occurs with different patients; only the most general features are considered, while the specific features are left out of account. The relation between a concrete case of illness and the corresponding disease-type should be the guiding principle of the treatment. In contradistinction to comparative pathology the greatest value for clinical practice should be attached to the method of correspondence.

Researches in regard to the Christian science of medicine, the critical approach of its principles includes frequent comparison with the so-called neutral science of medicine and here, too, the principle of comparison will be helpful. The importance of comparison comes out most clearly in the psychic domain. This psychic domain does not only include the domain of psychology and psychiatry but also that where somatic and psychic phenomena border on each other, the domain of psycho-somatic medicine.

On 10 November 1950 Dr J. Lever took up his post as a lecturer in Zoology with an oration on "The species-conception and the living structures" 5).

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5) *Het soortbegrip en de levende structuren.* Loosduinen, Kleijwegt, 1950 (22 p.).

The development of the biological species-conception is distinguished by the author into four phases: the scholastic-, the transition-, the mechanistic-evolutionistic-, and the modern phases respectively. During each of the phases mentioned the biological significance of the species-conception is determined by a philosophic system: during the first phase by the compromise of Greek philosophy and Christian believe, during the second phase by the philosophy of Leibniz, during the third phase by evolutionistic monism and in recent years the significance of the species-conception is influenced by the dispute between neo-vitalism, mechanicism and Holism. The author states that it is a necessity to replace these philosophies by a Christian one and he means that from a religious as well as from a scientific point of view one has to attach great value to the so-called "Philosophy of the idea of law". On the basis of biological data it is shown that in its application to the species-problem this philosophy is in harmony with reality and moreover that it gives directives for further development of theoretical and practical biology.

On 23 February 1951 Dr G. Wielenga took up his post as a lecturer in the Faculty of Arts with an oration on "Experimentation in Education" [6]).

Here follows a summary:

Both philosophy and experimentation play their part in each sector of educational theory. In the specification of ends and objectives philosophy will have emphasis, but the design of teaching methods asks primarily for factual data as a basis. It may be a question of principle, however, what has to be eccepted as a fact and it certainly *is* a question of principle whether the laws of nature are seen as evidence of the order God has laid in His creation or not. As we hold the first position we ought to take into account so much the more the factual data of experience.

Neither the personal experience of the teacher, nor the matured experience called "tradition", however, are reliable enough to base a theory of teaching upon them. Only experience that is scientifically obtained and tested makes a valid and reliable foundation, in other words: educational theory ought to have an experimental basis.

Especially American educationalists have done much work in this field. According to European criticism one cannot deny that "statistical sophistication" is often an apt description of their work, whilst many of their socalled "objective-achievement-tests" are only quasi-objective and do not measure educationally important performances. But one has to concede too, that in connection with the growing influence of organismic psychology in America the stress is laid more and more on comprehensive appraisal, the evaluation of general educational development and the measurement of understanding.

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[6]) *Het experiment in de Didactiek.* Groningen/Djakarta, J. B. Wolters, 1951 (24 p.).

In the following paragraphs we will deal especially with classroom experiments and not so much with psychological-laboratory experimentation with direct educational bearing.

The structure of an experiment has to be adapted to the structure of the object. Therefore one does not regard any more as essential for an experiment the elimination of all non essential concomitant factors by rigidly controlling them in an artificial set up. Instead of the planned change of one experimental factor the statistical analysis of variance often comes to the front. Essential, however, remains the purposeful and systematic observation in a wellconsidered problemsituation.

One cannot deny that most "experiments" in education are not experiments in the proper scientific sense. It would be important if this could be so, because otherwise they lack cogency, their interpretation cannot be reliable and their generalisation cannot be valid.

The design of a classroomexperiment includes 1^0 a specification of the objectives; 2^0 a specification of the means to attain them; 3^0 a specification of the methods to establish and to interpret the results and 4^0 a specification of the way in which the concomitant factors may be kept under control.

The first two points only express the necessity to analyse the structure of the problem beforehand.

The third phase is that of understanding and interpreting the answers to the questions put in the experiment. It breaks up into two parts. The first is the *selecting* of the *criteria*. Although the subjective opinion of an experienced judge about schoolperformance, achievement in college or success in business has its objective value, one should prefer a purely objective measure stick, if it is possible to create such a thing.

The problem of the objective evaluation is still unsolved. Some techniques present hopeful perspectives, for instance carefully prepared multiple-choice tests. On the other hand it is certain that *one* kind of test never can measure all important effects of the process of learning.

The second question is how to *interpret the results* of the "measuring". An experiment puts to the test a hypothesis. This hypothesis is, in psychological experimentation, mostly put into the form of a null-hypothesis, that is it is assumed that the observed difference is only produced by chance. More exactly formulated, the null-hypothesis affirms that all the differences obtained from all possible samples from the population would give a sampling distribution of differences with a mean of zero.

No inductive reasoning can ever lead to 100 % certainty. Here too the question whether the null-hypothesis may be rejected can only be answered with a certain degree of confidence. This degree has to be established in advance. Thus the results are divided into two classes, one of which shows a deviation from the null-hypothesis one is willing to consider "statistically significant at the chosen level of significance". What the psychological meaning of a statistically significant difference is, is quite another point. That depends on the structure of the experiment, in particular on the question whether and in what way other relevant factors have been controlled.

Hence the importance of the fourth phase mentioned above. As random sampling is an assumption underlying the null-hypothesis proper attention should be given to randomisation of the experimental procedure concerning certain factors. Other factors, however, may have so large an effect on educational results that they have to be kept rigidly constant. So it will be necessary to analyse the problemsituation in one way or another in advance, that one may know as much as possible about the concomitant factors.

Only two methods to meet the difficulties connected with the controlling of relevant factors will be mentioned.

The method of *equivalent groups,* with paired pupils, is an approximation as close as possible of the original ideal of experimentation, viz. the isolation of the experimental factor by keeping all others constant. On the whole the results have been disappointing. To mention some objections: 1^0 it is very difficult to decide whether *all* relevant factors are controlled; 2^0 as the number of pairs necessarily will be small the sensitiveness of the experiment is unsatisfactory; 3^0 the selection of individuals inherent to this approach makes the representativeness of the sample dubious; 4^0 the method is too artificial by its oversimplification.

Concerning the fourth point: studying the effects of the factors separately by isolating them as experimental factors makes only sense if one may assume, as is done in physics, that the sum of the actions of a number of factors equals the action of all acting together. In psychological research, however, the probability of *interacting factors* is too great to be ignored. The acting factors in the process of teaching and learning may not be isolated without loss of insight into the true nature of the process, since it is complex by nature. Not only have the observed groups to be representative of the schoolpopulation, the experimental situation has to be representative of the normal classroom situation too.

Experiments of *factorial design* try to meet this condition. The variables are studied then in all possible combinations, so that light is shed both on the effects of each separate factor and on their possible interaction. In such a way a wider and more reliable inductive basis for generalisation is laid.

A serious objection, however, is that the observed groups will probably not be representative of the schoolpopulation, as they will mostly be chosen from one school. So repeating the experiment in different schools will be necessary. But a repetition is recommendable in any case to increase its conclusive force.

Summing up: the main difficulty appears to be the reliable interpretation and the valid generalisation of the experimental results. So the experimental design is of the greatest importance. Two points may be emphasized again in this connection. The experimenter has to make sure that the assumptions underlying the tests of significance, mostly true randomisation, are fulfilled. Moreover he has to keep in mind that the operation of a teaching method and its effectiveness depends on the total situation in which it functions.

The danger of stressing the difficulties of classroom experimentation is, however, that it will perhaps, by waiting for a foolproof experiment, prevent any tryout of a new method, whereas the objective testing of all kinds of new ideas is highly important, as only facts carry conviction.

FAREWELL-ADDRESS

On Friday, November 17 of the year 1950 Prof. Dr G. Ch. Aalders in the chair of Old Testament, retiring on account of having reached the age of 70, delivered a farewell-address on the subject: *Old Testament study to-day*[7]).

The retiring professor reminded his audience of his inaugural address, thirty years ago, on the *Turn of the tide in Old Testament criticism*. Looking back on the years of his Academic activity he wished to answer the question whether this turn of the tide has been proceeding or the phenomena to which he pointed in his inaugural address were simply of a transient character, and on the part of Old Testament criticism merely to be stamped as a „reculer pour mieux sauter".

First of all then he called attention to a field of Old Testament study in which at the time of his inauguration no shifting whatever was to be noticed: textual criticism. The turn of the tide made itself known in the 18th international congress of Orientalists, held in Leiden from 7 tot 12 September 1931. In the Old Testament section M. S. Daiches from London took the lead here to enter a forceful protest against the prevailing tendency of amending the Hebrew text on largely subjective grounds. This opposition some years later was energically pushed on by the Swedish scholar Nyberg. And a remarkable symptom of its progress was the appearance in 1947 of a commentary on the Book of Psalms by the former professor of Old Testament in the Leiden University, B. D. Eerdmans, entirely based upon the Masoretic text. A momentous result of the changed situation was the possibility of cooperation in the matter of translation, as can be practically seen in the completion of a new Dutch translation of the Old Testament by scholars of various persuasion, at the initiative of the Netherlands Bible Society, which is before long to be expected. In a surprising way the changed attitude towards the Masoretic text was justified by the notorious find of the Dead Sea Scrolls. The judgment of the American archaeologist Albright: "the Isaiah Scroll proves the great antiquity of the text of the Masoretic Book, warning us against the light-hearted emendation in which we used to indulge" was verified by the retiring professor in comparing the readings in 60 of the most crucial cases; only in ten of these the usual emendation was supported by the old manuscript.

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[7]) It was published in Dutch under the heading: *De huidige stand der Oud-Testamentische Wetenschap*, Kampen 1951.

In his inaugural address the speaker had pointed to the turn of the tide which made itself known in literary criticism. Now he could state that this remarkable change of opinion had proceeded considerably; as Prof. Joh. de Groot on occasion of his inauguration in the chair of Old Testament in the University of Utrecht, in 1936, said: "The vessel of literary criticism will have to be docked for entire reconstruction, before it will be able again to render reliable auxiliary service; the repair, I fear, will last very long". To corroborate this pronouncement the speaker pointed to the following facts: the presumed date of Deuteronomy under king Josiah and its emphasis on concentration of the cult were called in question from very different quarters; the separate existence of the "sources" P and E was most peremptorily denied by competent scholars; Yahuda observed in the Pentateuch so many traces of Egyptian influence that he found himself in the necessity of ascribing it to a date very near to the Exodus; Umberto Cassuto produced a volume of severe criticism on all the arguments which are generally adduced by adherents of the documentary theory. New theories have been advanced: by Dornseiff, Vaccari, Noth, Engnell. The commonly favoured junction of the books of Moses and the book of Joshua into a Hexateuch is absolutely rejected.

In the case of other outstanding problems of literary criticism the turn of the tide may not be conspicuous, but still there are some remarkable symptoms: the unity of Isaiah was firmly defended in 1928 by Kaminka, the unity of Zechariah is maintained by Edelkoort, the successor of De Groot in Utrecht. With respect to the book of Daniel it is noteworthy that the former argument for a late date from the Aramaic has to be abandoned: the Aramaic of Daniel is the artificial language introduced by Darius I. Furthermore it is interesting to remember how many scholars assign an earlier date at least to the Aramaic part; and Eerdmans advances an interpretation of Dan. II and Dan. VII by which the contents of these chapters are confined to the Babylonian period.

In order to avoid onesidedness the speaker mentioned the criticism of Torrey on Ezekiel, and that of Louise Pettibone Smith and Ernest R. Lacheman with respect to the book of Zephaniah.

What however, in his opinion, is the most striking feature in Old Testament scholarship to-day: there seems to be a considerably diminishing interest in literary criticism. It was already De Groot who thought he observed a certain fatigue regarding the old problems of literary criticism. This surely does not mean that scholars have a dislike of literary analysis of the books of the Old Testament; upon occasion they undoubtedly will be inclined to break a lance for it, but real scientific interest is presently moving in another direction: it rather aims at the investigation of the contents of the Old Testament. This can clearly be seen from the book *Record and Revelation,* from a study like that of Norman H. Snaith, *The distinctive ideas of the Old Testament,* and from a series of detailed inquiries into the notions of Sedaqa, Mishpat, Chesed, Kebod Yahweh, Tora, and so on. Remarkable is also how Old Testament scholarship nowadays exhibits a trend to take into account the element of *revelation.* For this there are two reasons: the anti-Jewish attitude of German Nazism and the theology of Barth. In connection with the attitude of Nazism a flow of papers appeared on the significance of the Old Testament, and Barthianism has made it easy for many Old Testament students who cannot abandon literary and even historical criticism of the Divine Book to acknowledge nevertheless its revelatory character. But this likewise proves that such a return to Revelation is not a return to the Reformed principle, laid down in the Dutch Confession of Faith. Therefore our rejoicing in the turn of the tide cannot be without reserve; and it remains the duty of Reformed scholarship to follow its own path.

In concluding the retiring professor excused himself for not having given exhaustive information, but, as he expressed himself, he wanted to grasp this opportunity to review the development of Old Testament study during the years of his professorship as by a Thunderjet-flight.

He thanked the Lord for what he had been able to do, with so many shortcomings, and invoked Gods blessing upon his successor and upon the Free University.

REVIEW OF BOOKS

THE THEOLOGY OF CALVIN

The extreme significance of Calvinism is an indisputable fact [1]. There is the history of well-nigh four centuries to prove the correctness of this claim in every way. And also to-day there are many, to whom the editors of this periodical together with the whole Free University deem it an honour to belong, who are firmly convinced that its force and significance are still anything but exhausted.

Now it is impossible to understand Calvinism without a sound knowledge of Calvin and his views. For this purpose it is essential that we should have reliable expositions of Calvin's ideas in various domains. There is no lack of excellent monographs. Their number is even rather great and is still increasing. In the first number of this periodical I had an opportunity to announce the excellent work of W. Kolfhaus on Calvin's ethics. And in the course of this article I shall have the privilege of calling the attention to yet another monograph. But we require more than treatises embodying the results of investigation on a single subject or on a single aspect of a subject. In addition to these a good concise survey of the sum total of Calvin's theology is indispensable. We should be enabled to get acquainted, in a form free from digression, with the fundamental character of his theology and at the same time to penetrate into its problems.

Books of this sort, which meet the requirements of modern scholarship are pretty scarce. Of those written in German we may mention the excellent book by Niesel, which appeared in 1938 [2]. It does not contain a complete exposition of Calvin's theology with all its various doctrines. In the preface the writer himself declares that his aim is "an Hand wesentlicher Stücke der Theologie Calvins das Ganze seiner Lehre aufzuzeigen".

Of books written in English we possess the well-known, if somewhat older, work of A. Mitchell Hunter, of which a new revised edition appeared recently [3]. In Holland, which otherwise shows a wide-spread sympathy with Calvinism and a profound scientific interest, we don't possess any work of this kind. The Stone-Lectures by Abraham Kuyper on

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[1] This review was suggested by the following books:
François Wendel, *Calvin. Sources et évolution de sa pensée religieuse.* Paris, Presses Universitaires de France, 1950 (292 p.); and T. F. Torrance, *Calvin's Doctrine of Man.* London, Lutterworth Press, 1949 (183 p.).

[2] Wilhelm Niesel, *Die Theologie Calvins.* München, Chr. Kaiser, 1938 (Einführung in die evangelische Theologie Band VI).

[3] A. Mitchell Hunter, *The teaching of Calvin. A modern interpretation.* London, J. Clarke & Co, 1950.

Calvinism [4]), however important to get acquainted with modern Calvinism in Holland, are not helpful in this respect. As regards books written in French, there is every reason to make here once more recognition of the truly monumental work of Doumergue, an achievement 'aere perennius' indeed. But this work is of a rather bulky and inconvenient size: it often departs from the main theme and thus mars the unity of the whole; it lacks the compactness which is essential to a successful use by the general reader. This is why we warmly welcome the publication of the book by Wendel, professor in the university of Strasbourg. He appears to be perfectly familiar with the literature on Calvin and the questions at issue. We receive from him a work which provides an excellent orientation on Calvin's theology. The exposition of Calvin's views is preceded by a brief sketch of his life. All kinds of details are of course left out of account. But in the three chapters which bear on the subject and which deal successively with Calvin's youth, the period of his first till his second stay in Geneva, and with the organization of the church in Geneva and the struggle for orthodoxy, the main questions are all brought forward. Recent investigations are taken full account of.

I think this an advantage over the books by Niesel and Hunter, in which this sketch is absent. By this happy idea Wendel has a convenient opportunity to point to the connection between Calvin's views and his life. For it is an unmistakable fact that the experiences and difficulties which he has gone through in the course of his life have influenced his views and the elaboration of them.

There is yet another factor which contributed to making Wendel successful in reaching this result. He is not satisfied with a mere exposition of Calvin's views as they are known from his *Institutio religionis christianae* of 1559. He also pays attention to the development of these views as may appear from former editions of this work. And in a separate chapter he discusses the history, the sources and the object of this work. It is obvious that in this way Calvin's views as they are historically determined come up for discussion. Attention is drawn both to the various influences which have affected Calvin's views and to the distinctive stamp they bear. The author rightly emphasizes the influence exercised first by Luther and then by Bucer. In this respect Wendel is right as over against Polman; and in the matter of the influence of humanism as over against Potgieter, both of whom have in their theses submitted to the Free University for the Doctor's Degree [5]) defended the originality of Calvin more than is justified.

In his exposition Wendel has exercised some restraint. As appears from the title of his book, he only treats of the *religious* views of Calvin. And he strictly confines himself to this subject. Calvin's views with reference to government and state are left undiscussed though these subjects are specially dealt with in the *Institutio*. In this respect Wendel differs from Niesel, who devotes a chapter to this subject, and also from

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[4]) A. Kuyper, *Calvinism*. Amsterdam-Pretoria, Höveker & Wormser, 1899.

[5]) A. D. R. Polman, *De Praedestinatieleer van Augustinus, Thomas van Aquino en Calvijn*, 1936; F. J. M. Potgieter, *Die verhouding tussen die theologie en die filosofie bij Calvijn*, 1939.

Hunter, who in addition to this treats of Calvin's opinions on art, music and science. Wendel's objection that no sufficient preparatory study has yet been made of the above subjects, is no reason, I think, for excluding them. On the basis of the monographs that have appeared so far, it would certainly be possible to present a preliminary summary of these important subjects. It would have made Wendel's book more complete. Nevertheless we cannot but assent to the wish of the writer to confine himself to his self-imposed task.

An important feature of the book is that it does not merely defer to the opinions of others. It bears a critical character and contains many an observation worth considering. Wendel points to traces which scholastic theology, especially that of Duns Scotus has left on Calvin (p. 92). He establishes the presence of humanistic elements as foreign features in Calvin's theology (p. 17, 18) and in stating the equivalence of justification and sanctification as gifts of grace as over against the overemphasizing of justification by the Lutheran theologians, he suspects the influence of Erasmus (p. 195). He is of opinion that Calvin has not always escaped the danger of adapting Scripture to the needs of his own doctrines, especially with reference to the doctrine of baptism, and that he sometimes stretches the text of the Bible (p. 275). On the other hand he defends Calvin against the charge of an exaggerated legalism when beside the New Testament he also treats the Old Testament as the Word of God (p. 117). He discovers in Calvin the idea of a progressive revelation in the history of Israël (p. 150). He notices with Bohatec a weakening of the difference which, in spite of everything, exists between Luther and Calvin (p. 229). And thus more interesting observations could be made.

The book contains a Bibliography which deserves special mention, be it that some items which might have been included, are still lacking, even if the latest publications are left out of account. *L'esthétique de Calvin* by L. Wencelius (1937) and *The Oracles of God. An Introduction to the Preaching of John Calvin* by T. H. L. Parker (1947) are not mentioned. But as a whole the bibliography excels in a certain completeness. I can't omit expressing my warm acknowledgment that the literature which has appeared in Holland has not been forgotten and that the author has taken due notice of it. He is acquainted with the theses defended at the Free University on the subject. And as to the work of Dr W. F. Dankbaar on Calvin's doctrine of the sacraments (1941), he appears to welcome it with such lively satisfaction that he expresses the wish to have it translated into French.

A special subject of Calvin's theology is treated in Torrance's monograph on his *Doctrine of Man*. This book is also mentioned in Wendel's bibliography and sometimes also in his notes (p. 129). In my opinion, however, he has taken too little account of it in arranging his subject matter. This may be accounted for by the fact that Wendel did not get access to this work until he had practically completed his own work.

We have here a very important exposition before us, which deserves a permanent place in our literature on Calvin.

As to the lines on which he has been working the author himself says in his Preface: 'It has been my attempt to lay bare Calvin's own thought and to present it as far as possible in his own way and in his own words. Traditional Calvinism I have studiously avoided, and have made no reference to works on Calvin ancient or modern, so that this presentation might be free from the imputation of partisanship in any of the different schools such as that of the Dutch Calvinists, or that of W. Niesel and the late Peter Barth. Consequently, the bulk of the book consists of citations gathered from all over Calvin's works, and arranged together with as little explanatory material of my own as was necessary'.

In support of this standpoint he rightly adds: 'One of the calamities of traditional exposition and interpretation of Calvin's theology has been by means of arid logical forms, to make Calvin's own distinctions too clean and too rigid. This has resulted in an over-simplification which has obscured the flexibility as well as the range and profundity of his thought. There is no doubt that Calvin was at times himself guilty of this procedure, particularly in his more systematic treatises when he was engaged in debate, as in regard to the problems of predestination and providence, but in the vast bulk of his work where he sticks closely to the Scriptures there is much profound theology that has never been sufficiently brought to light.' Torrance has fulfilled his task in a commendable way and, as far as I can see, he has done full justice to the position taken by Calvin. The subject matter is divided into twelve chapters, which subsequently deal with: Man's knowledge of himself; Man's place in creation; The image of God (4 chapters); Total perversity (2 chapters); The sin of mind; The mind's knowledge of God; Natural theology (2 chapters). The exposition of the most difficult problem of the image of God deserves special mention. It is conspicuous by its accuracy, clearness and completeness.

It is to be regretted, in a way, that the author has desisted from referring to the works on Calvin, both as to whether he agrees with them or opposes them. If so, it would have become clear of what 'Dutch Calvinists' he has taken cognizance and to what degree he differs from them or not. He would certainly have found a congenial attitude in the Dutch literature on the subject. In this connection I wish to call special attention to a succinct article by W. E. den Hertog on the Anthropology of Calvin in the periodical 'Vox theologica' [6]). The general bearing of this article agrees with the conclusions at which Torrance arrives.

I have pleasure in quoting this author once more, when in his Preface he declares that 'in John Calvin the Reformed Church has had a theologian with magnitude in mind and depth in understanding, second to none in the history of the Christian Church'.

D. NAUTA

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[6]) *Vox Theologica,* Interacademiaal Theologisch Tijdschrift, IX; (April 1938), p. 137—148.

CHRISTIANITY AND CLASSICAL CIVILIZATION

The greatest wonder in the world's history is undoubtedly the appearance of Christianity in the ancient world[7]. How was it possible that from a small country like Palestine, lying far from the centre of the high Greco-Roman civilization there arose an apparently barbaric creed which within a period of three centuries dominated the whole cultural world? No wonder that those who only reckon with human factors have attempted to answer this question in a human manner. The teaching of Jesus, the doctrines of Paul and the other apostles were made an object of investigation, leading to results which seemed to warrant the conclusion that they contained all kinds of essential elements which had long been present in pagan philosophy. Thus it was attempted to demonstrate that the Christian doctrine was nothing but a collection, gathered with admirable grasp, of the best thoughts of the pagan world. Various views could be shown to be in agreement with each other; sometimes even there was a literal agreement between the utterances of pagan thinkers and Christian apostles. These were indeed striking arguments and it need not be surprising that if brought forward with convincing force, they could not fail to make a deep impression on the laymen, who were unable te verify them. And yet, scholars were certainly able to raise serious objections to the view that Christianity resulted from paganism. It required a profound knowledge of the essence of Hellenistic culture, for shadow and substance should be clearly distinguished. And whereas the advocates of this "Pre-Christian Christianity" popularized their opinions (witness the works of Van den Bergh van Eysinga in this country) and won many adherents through this, especially among those who were strangers in the domain of antiquity, the works in defence of Christianity by those who assigned a metaphysical origin and an absolute significance to Christianity remained restricted to the scientific sphere.

For this reason the book of Prof. Stob deserves a hearty welcome. It treats the problem of the relation between Christianity and paganism in such a way that the educated reader can understand it. It does not, moreover, confine itself to the general points but enters into the details. It discusses questions such as: Is there a God; God and the Logos; God and the world; God and man; the Nature of Man; Soul and Body; the last Things and in detail: Christian and Pagan Ethics. With great ability Prof. Stob reproduces what the pagan world has taught on each subject and sets against it the Christian doctrine. We cannot enter into detail on all these subjects but will not omit mentioning the conclusions at which the writer arrives and with which we fully agree.

"First, some of the cardinal Christian teachings find no place in the views of the ancient Greeks and Romans. They are entirely absent from their view of life. This, however, is a small number. Second, there are also phases of life or views with reference to such phases quite directly contradictory to the view of Christianity. This antithetical view was strongly felt by some of the apologists and Fathers of the church. The instances of such direct opposition are also comparatively few. Finally, there is a large number of points of view in which the same subject is treated. In these instances there is often an approach to the Christian view, and in some cases one can find a real similarity in expression. Taken by themselves, removed from their general background, they appear to teach the same thing. However, a careful investigation into the real meaning of such apparently similar expressions in view of other teachings and the general background has not revealed identity but divergence or opposition or deficiency. It appears therefore that formally there is a real approach to identity but materially there is not. For either the approach contains contradictory elements or it falls short. In every case there has appeared a unique element in the Christian view. There is indeed a special revelation."

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[7]) Ralph Stob, *Christianity and classical civilization*, Grand Rapids, Michigan, Baker Bookhouse, 1950.

This was a long quotation but it reveals exactly the real state of affairs. The great mistake which is often made in investigations like these is the mistaken idea that the same words when used by a pagan and a Christian are identical in meaning. To mention an example. The Christian as well as the old Stoic philosopher say: we must be one of will with God. But when the Christian says this, he means that we must put ourselves with full trust in the hands of God, our Father, who knows what is best for his children. But to the Stoic philosopher, for whom God is identical with Fate in the sence of an indissoluble chain of cause and result, this same expression means that we resign uncomplainingly to fate, which is not to be escaped from and rules us with an iron hand; if we resign to it without objection, we have that feeling of voluntariness which a dog possesses when tied with a chord to a riding cart. This example shows clearly that sameness of terminology does not imply sameness of intended meaning.

The author discusses in his work a great number of similar apparent resemblances, which might confuse the inexpert reader but which to the professional scholar are perfectly clear. In this lies for the greater part the special significance of the work. A second error which has been made sometimes is that a resemblance of literary form between Christian and pagan utterances has led to the assumption of material affinity. If, for instance, some parts of Paul's letters as far as the outward form is concerned, remind the reader of the diction of the diatribe, i. e. the popular philosophic discourse in antiquity, this does by no means imply that the contents are derived from the diatribe. Again, when the apostles preach in the streets, as was also done by the Cynical Stoics, this does not mean that the content of their preaching is related to the pagan order of ideas. The apostles were children of their own time and made use of the possibilities afforded by the culture and civilization of that time. But this is no evidence against the divine origin of their teaching.

It seems to me that Prof. Stob has treated all this in the right manner. He does full justice to paganism by a detailed and objective treatment. In doing so the difference between Christianity and pagan civilization is well brought out. In writing this book he has done excellent work and struck a well-principled Calvinistic note in the American world.

It goes without saying that I have put some marks of interrogation here and there and made a few corrections for myself. But these concern minor points only and do not affect the line of argument of the work. It struck me that the author, while apparently understanding Dutch, mentioned hardly any Dutch works in his book reference, though in our country, of all others, an important school of opponents has flourished, now all but dead. The popular works of this school still have their harmful influence with some people in our country and this is the reason why I hope that Stob's book may find a wide circle of readers here.

A. SIZOO.

PRINCIPLES OF BIBLICAL INTERPRETATION

Some years ago Dr Berkhof edited his *Beknopte Hermeneutiek*, a book written in the Dutch language. The book was not publicly sold, besides it could not help American students, because they cannot read a Dutch book. Therefore, we understand that Dr Berkhof gives us now an English edition of his work on Hermeneutics[8]). It may be said that, generally speaking, the new book follows the lines of its predecessor.

The book is above all things a Reformed, a Calvinistic book, and that is its great merit. Anglican students and all that understand the English language have an opportunity now to study Hermeneutics consulting a truly Calvinistic textbook.

A textbook. That is, I think, the right description of this new publication. It treats shortly of the main things that are at stake if anybody studies the Bible, the whole Bible because it contains rules for the exposition of the Old Testament as well of that of the New. We are happy to remark that the theological interpretation is stressed, 33 pages of the 166 being devoted to this subject.

On the whole we agree with the rules and the expositions given by Dr Berkhof. His startingpoint is the only one a Calvinistic theologian can start from, viz. the belief that the whole Bible is the unfallible Word of God, and the explanation is in accordance with this principle.

We have a few objections. The historical review ends at the middle of the 19th century. Books of our time are not discussed or even mentioned. Nothing about Bultmann *(Entmythologisierung)* and his cooperators, nothing about the Scandinavian school. That is a pity. We can no longer stick to Lightfoot when Strack-Billerbeck appear. After a long sleep the hermeneutical discipline awoke and it came to new life with a new face. Students should hear something about the new remarkable and important theories.

We recommend this book of Dr Berkhof as a good Calvinistic work on Hermeneutics.

F. W. GROSHEIDE.

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[8]) L. Berkhof, B.D., *Principles of biblical Interpretation (Sacred Hermeneutics)*. Grand Rapids, Michigan, Baker Bookhouse, 1950.

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RECTIFICATION

In the last issue of the Free University Quarterly (Vol. I, No 2), p. 109, line 23, should be read: the patient and his illness.